IRRDB meeting, London, 26-27 June 2013.
Irrdb breeding group.

Country report of activities from 2011 to 2013 (Cirad, France)

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CIRAD
Research unit : Agap
Team EGV : Assessment, management and use of genetic resources.
Head of the team EGV : Marc Seguin

Most of our research activities are carried out in cooperation with other partners.

This report does not include the activities of the team Burst (Head : Pascal Montoro) in the field of molecular physiology.

1) Genetic mapping and QTL detection of the family F1 RRIM600 x PB217 in Thailand

Phenotypic measurements have been ended. Ms Ratchanee Rattanawong (RRIT-DOA) defended her PhD thesis on April 4, 2012. Publications are in preparation, first with the genetic mapping of the family (Prapan et al), then QTL detection in the fields of growth, latex production, and rubber quality (Rattanawong et al.).

2) Project Cirad-Michelin of research and breeding for tolerance to Microcyclus (SALB)

This project includes research on SALB epidemiology in French Guyana, breeding in Plantation Michelin de Bahia (Brasil), and genetic research in Montpellier (France). This project includes Brasilian university cooperations such as UESC (Ilheus, Bahia), Unicamp and Usp in Sao Paulo State.

3) Project IFC (French Institute for Rubber) of early selection and assessment of clones in West Africa

The French Institute for Rubber (IFC) is an association of mainly 3 rubber companies (Michelin, Siph, Socfin). Since the beginning of 2011, IFC is funding a project distributed among 5 sites and 4 West African countries (Liberia, Côte d'Ivoire, Ghana, Nigeria) including early selection, the study of rubber clones in large scale clonal trials, recommendation of clones, and dissemination of knowledge and information about rubber clones. This includes the study of 2 F1 families by a QTL approach for assessing the efficiency of within-family marker-assisted early selection. It is also planned to investigate of the potential of association genetics at the level of the whole Wickham population.

4) Project IFC of study of the diversity of Corynespora pathogenesis factors and of early selection for rubber tolerance to Corynespora

Research is developed at Cirad, and at Umr Piaf in University Blaise Pascal from Clermont-Ferrand (France) on the diversity of genetic factors and pathogenesis factors involved in rubber tolerance/resistance to *Corynespora*. A test based on purified toxin (cassiicolin, cas1) was set up and will be applied to field research, early selection and QTL detection, together with classical tests by fungus inoculation on rubber plantlets in controlled conditions.

5) Research of candidate genes

Investigations are carried out on candidate genes possibly involved in rubber defense against leaf diseases and abiotic stress, in sucrose loading in the latex cells, by "EST profiling" approach or targeted molecular physiology approaches. Physiological validation, allelic diversity studies, and development of SNP genetic markers associated with these genes.

6) Genotypic identification

In rubber, vegetative multiplication can be a source of mistakes thus leading to unproper genetic identity of clones. In Cirad we use a set of 8 SSR markers for genotyping varied leaf samples which are then compared with a file of more than 1000 reference patterns. This is proposed to rubber planters as an expertise service. Since 3 years, we carried out around 5000 clonal conformity analyses. This can also be used for checking the possibility that one clone is really a progeny from the assumed parental clones (control of legitimacy). We also plan to extend it to paternity identification, i.e. determining the male parent at the origin of a progeny collected from an already known mother-tree. This practical application of molecular genetic markers is currently a very useful innovative tool for rubber development.

7) Research on the genetic determinism of selection traits

This is carried out by the QTL approach (growth, latex production, tolerance to *Microcyclus* or *Corynespora*) and/or by functional genomics (sucrose content in the latex, as an indicator of rubber tolerance to tapping and stimulation).

8) Irrdb multilateral exchange of clones

Cirad, associated with Michelin company and the Ghana Rubber Estates Limited (Grel), will participate to this operation and we propose the 5 following CMS clones : CDC312, FDR4575, FDR5240, FDR5788, PMB1. Rubberwood will be sent to other participants from Ghana. We will receive the budwood and experiment the clones from other participants in Grel. We will analyse leaf samples from every participant in order to check clonal conformity along the exchange operations.

9) Training through research

Cirad regularly welcomes researchers from abroad for training to SSR genetic mapping and QTL detection. Today, we welcome Mr Tran Dinh Minh (RRIV) who carried out 3 parental genetic maps and 2 F1 family maps by SSR genotyping in the course of his Master degree in Montpellier II University (France). Starting from September 2013, Mr Tran Dinh Minh will develop a PhD research in the field of early selection for Corynespora tolerance.

10) Management of a rubber germplasm collection in French Guyana

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